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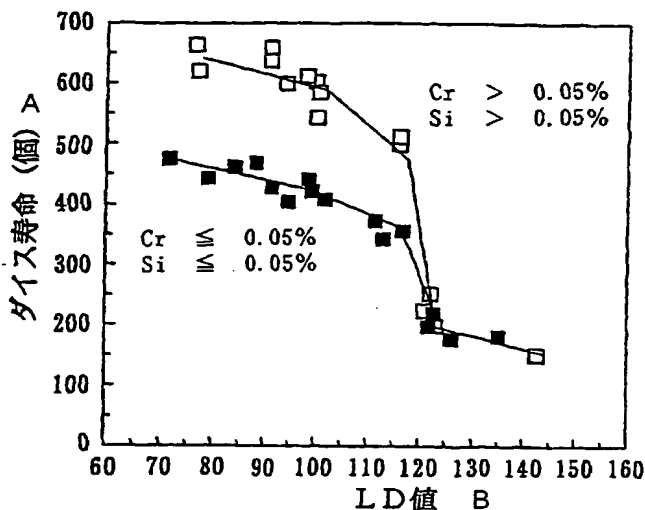
(84) 指定国 (広域): ヨーロッパ特許 (AT, BE, BG, CH, CY,  
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PT, SE, SI, SK, TR).

添付公開書類:  
— 国際調査報告書

[続葉有]

(54) Title: STEEL MATERIAL FOR MECHANICAL STRUCTURE EXCELLENT IN SUITABILITY FOR ROLLING, QUENCHING CRACK RESISTANCE, AND TORSIONAL PROPERTY AND DRIVE SHAFT

(54) 発明の名称: 転造性、耐焼割れ性およびねじり特性に優れた機械構造用鋼材およびドライブシャフト



A...LIFE OF DIE (NUMBER)  
B...LD VALUE

(57) Abstract: A steel material for mechanical structures which comprises, in terms of percent by weight, 0.35 to 0.50% carbon, up to 0.15% silicon, 0.2 to 1.1% manganese, up to 0.020% phosphorus, 0.005 to 0.035% sulfur, more than 0.1 to 0.2% chromium, 0.05 to 0.5% molybdenum, more than 0.01 to 0.05% titanium, 0.01 to 0.05% aluminum, up to 0.01% nitrogen, 0.0005 to 0.0050% boron, 0.06 to 0.25% copper, 0.05 to 0.2% nickel, and iron and unavoidable impurities as the remainder, and which has a value of LD shown by the following equation (1) of 120 or lower.

[続葉有]

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2文字コード及び他の略語については、定期発行される各PCTガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。

(57) 要約:

質量%でC: 0.35%以上0.50%以下、Si: 0.15%以下、Mn: 0.2%以上1.1%以下、P: 0.020%以下、S: 0.005%以上0.035%以下、Cr: 0.1%超0.2%以下、Mo: 0.05%以上0.5%以下、Ti: 0.01%以上0.05%以下、Al: 0.01%以上0.05%以下、N: 0.01%以下、B: 0.0005%以上0.0050%以下、Cu: 0.06%以上0.25%以下及びNi: 0.05%以上0.2%以下、残部Fe及び不可避不純物からなり、次式(1)で示すLD値が120以下の機械構造用鋼材及びドライブシャフト。

$$LD = 0.569 \times \{ 7.98 \times (C)^{1/2} \times (1 + 4.1Mn) \\ (1 + 2.83P) (1 - 0.62S) (1 + 0.64Si) (1 + 2.33Cr) (1 + 0.52Ni) (1 + 3.14Mo) (1 + 0.27Cu) (1 + 1.5(0.9 - C)) \} + 52.6$$

## INTERNATIONAL SEARCH REPORT

International application No.

JP02/13564

## A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl.<sup>7</sup> C22C38/00, 38/50, C21D9/28

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl.<sup>7</sup> C22C1/00-49/14, C21D9/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1926-1996	Toroku Jitsuyo Shinan Koho	1994-2003
Kokai Jitsuyo Shinan Koho	1971-2003	Jitsuyo Shinan Toroku Koho	1996-2003

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 9-3592 A (Toa Steel Kabushiki Kaisha), 07 January, 1997 (07.01.97), Full text (Family: none)	1-3
A	JP 9-20958 A (NKK Corp.), 21 January, 1997 (21.01.97), Full text (Family: none)	1-3

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search  
29 January, 2003 (29.01.03)Date of mailing of the international search report  
12 February, 2003 (12.02.03)Name and mailing address of the ISA/  
Japanese Patent Office

Authorized officer

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